

PATENT ABSTRACTS OF JAPAN

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(54) FUNCTIONAL FOOD

(57)Abstract:

PROBLEM TO BE SOLVED: To enable a functional food for promoting the diuretic while simultaneously cleaning the blood without excessively restricting the diet to be safely and inexpensively supplied in large amount.

SOLUTION: This functional food contains chondroitin sulfuric acid derived from the nasal cartilage of a salmon or a trout, and sap of a tree belonging to the genus Butula of Betulaceae. In one case, the functional food is a soft jelly shape consisting essentially of the chondroitin sulfuric acid, and in the other case, the functional food is a liquid drink consisting essentially of the sap of the tree belonging to the genus Butula of Betulaceae. The chondroitin sulfuric acid is preferably obtained by pulverizing the nasal cartilage of the salmon or the trout, removing the fat from the pulverized product, decomposing the resultant product by using an alkali, subjecting the decomposed product to oxygen treatment, and purifying and extraction-treating the oxygen treated material, and the pulverizing of the nasal cartilage of the salmon or the trout is preferably carried out under a low temperature condition of -30 to -60° C.

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CLAIMS

[Claim(s)]

[Claim 1] Functional food containing the chondroitin sulfate of a salmon or the cartilages-nasi origin of **, and the sap of the Betulaceae Betula tree.

[Claim 2] Said functional food is functional food according to claim 1 characterized by considering as the shape of elasticity jelly which uses the chondroitin sulfate of a salmon or the cartilages-nasi origin of ** as a principal component.

[Claim 3] Said functional food is functional food according to claim 1 characterized by considering as the liquefied drink which uses the sap of the Betulaceae Betula tree as a principal component.

[Claim 4] Said chondroitin sulfate is functional food according to claim 1 to 3 characterized by performing enzyme processing and carrying out a purification extract after grinding a salmon or the cartilages nasi of **, degreasing and making it decompose using alkali.

[Claim 5] It is the functional food according to claim 4 characterized by performing grinding of said salmon or the cartilages nasi of ** under the low temperature service of 30-60 degrees C of minus.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the technique of manufacturing the functional food for starting the functional food containing chondroitin sulfate, especially mitigating obesity, the arthralgia, and ventilation to a large quantity and insurance.

[0002]

[Description of the Prior Art] Since the so-called functional food which brings about a healthily good result can be easily taken in in an everyday lifestyle and a formula is not limited like drugs, those who pay attention to health take in a component of a certain kind as part of a meal continuously.

[0003] As health food which came to be known recently, there are a thing of vitamin makeup, a thing which strengthens a bone. The food concerning this invention mainly mitigates obesity, the arthralgia, and ventilation. make it obesity — make it the arthralgia — it is thought that the cause is miscellaneous, and if the food concerned is taken in, the problem on healthy will not necessarily be solved promptly. However, common inclination of a certain kind thru/or correlation is found by symptoms, such as obesity, arthralgia, and gout. Obesity is the cause with the most fundamental overeating. Although it cannot be called a disease as itself, either, it can be called the condition that the circumstances which result in the arthralgia thru/or gout accompanying obesity have injured health also for the medicine top, and it is said that lowering of causes of food, such as excess of a uric acid, and a function in the living body is related.

[0004] About this point, invention given in JP,7-255416,A is known, for example. This is the functional food which added indispensable minute amount minerals, such as a selenium, to chondroitin sulfate including the chondroitin sulfate (mucopolysaccharide) which can be acquired from a shark fin etc. as a principal component. Suppose that it is effective when preventing aging prevention, especially energy decline in this invention in being able to prevent oxidation of the chain reaction-organization which it is pointed out that chondroitin sulfate is effective for aging prevention and nourishment sthenia for many years, becomes the constituent of the glutathione peroxidase in the inside of the body about a selenium, and originates in peroxylipid.

[0005] Moreover, invention given in JP,7-308169,A presupposes that it is this the component excellent in the rheumatism effectiveness, after pointing out that the MARO extract obtained from animal bone bone marrow, especially the mucopolysaccharide represented by chondroitin sulfate present a bioactive function for various components.

[0006] the technique applied to a chemical or food is proposed by on the other hand extracting an effective extract from the hippo NOR bamboo mycelium which made the sawdust the culture medium about a white birch (; containing other Betulaceae trees, such as bell KOUKAKAMBA, — below the same) (JP,10-323168,A). By this proposal, the purport which can extract an anti-gun component from the extract extract of a hippo NOR bamboo is pointed out.

[0007]

[Problem(s) to be Solved by the Invention] It is as pointed out by said JP,7-255416,A to act on the joint part of the bodies, such as rheumatism, and to obtain a good result, and chondroitin sulfate is indicated by the reference about Chinese meal medicine for many years, and is common knowledge.

[0008] By the way, the problem about chondroitin sulfate is in the point that a manufacturing cost becomes remarkably high, in order to use a shark fin and cow bone bone marrow as the main raw material. Acquisition of the chondroitin sulfate known for many years is mainly the shark fin origin (shark origin), and if it says at present, the sale market price of 1kg will change to an average of 150,000 – 160,000 yen.

[0009] Intake of the day of the chondroitin sulfate confirmed to an articular disease is set to an average of 1g. Therefore, to use the chondroitin sulfate of the shark fin origin, a consumer needs to pay 150 - 160 yen or more cost at cost at least. If other components are added to this, at least the actual cost of 200 yen of a manufacturing cost will be exceeded, and if transport cost and sale cost are taken into consideration, it will be forced the burden of the amount equivalent only by securing the minimum intake of a day. As a result, everyday continuous intake is in a difficult situation.

[0010] the cost price of bone marrow of the chondroitin sulfate of the cow bone bone marrow origin is alike and cheap compared with a shark fin. However, as compared with the weight of a raw material, there is fear of an infectious disease like mad cow disease that there is little yield, and anxiety remains in respect of safety.

[0011] On the other hand, in many cases, many articular diseases to those who are growing fat are seen, and follow the circumstances of rheumatism or gout from the slight arthralgia. The acidity of lowering of the cardiopulmonary function to which such causal relation originates in obesity thru/or the sugar in blood, and urine etc. is pointed out. As required treatment, they are prevention of obesity excessive in the first place, and clarification and relief of the acidity in blood (sugar).

[0012] Acceleration of a diet limit and urination can attain this most easily. However, since it is thought that obesity is not disease, even if the diet limit in an initial stage is difficult and it calls it urination acceleration, clarification or obesity prevention of blood cannot be performed in mere hydration. Then, without forcing an extreme diet limit, in order to raise a diuretic effect, intake of the functional component which disassembles the acid and sugar in blood apart from moisture, and is discharged outside of the body promptly is desired.

[0013] The object of this invention is as much as possible about the functional food which promotes urination, purifying blood simultaneously to enable [a large quantity, insurance, and] product supply cheaply, without carrying out too much diet limit.

[0014]

[Means for Solving the Problem] The functional food applied to this invention in order to attain said object contains the chondroitin sulfate of a salmon or the cartilagines-nasi origin of **, and the sap of the Betulaceae Betula tree.

[0015] This functional food may be used as the liquefied drink which may consider as the shape of elasticity jelly which uses chondroitin sulfate as a principal component, and uses the sap of the Betulaceae Betula tree as a principal component.

[0016] As for chondroitin sulfate, it is desirable to perform enzyme processing and to carry out a purification extract, after grinding a salmon or the cartilagines nasi of **, degreasing and making it decompose using alkali, and it is desirable to perform grinding of a salmon or the cartilagines nasi of ** under the low temperature service of 30-60 degrees C of minus.

[0017]

[Function] The functional food concerning this invention contains the chondroitin sulfate of a salmon or the cartilagines-nasi origin of **, and the sap of the Betulaceae Betula tree. As compared with the chondroitin sulfate of the shark fin origin, the functional component obtained eventually is abbreviation identitas, and let the chondroitin sulfate of a salmon or the cartilagines-nasi origin of ** be a raw material because large quantity acquisition is possible and a price is reduced overwhelmingly. Compared with the chondroitin sulfate of the cow bone bone marrow origin, there is no risk in safety aspects, such as an infectious disease, and, moreover, large quantity acquisition is possible at the same cost.

[0018] On the other hand, the sap of the Betulaceae Betula tree is used for promoting a diuretic effect and attaining clarification of blood in the living body. Moreover, by using the sap (for example, Betula-alba sap) of the Betulaceae Betula tree, the functionality as food taken in daily, such as a psychosedation operation resulting from characteristic aroma, can be raised. Betula-alba sap can come to hand comparatively cheaply from Hokkaido or many north area foreign countries.

[0019] When using chondroitin sulfate as a principal component, it becomes jelly-like food by moisture addition (when making [many] a compounding ratio), and when using the sap of the Betulaceae Betula tree as a principal component, it becomes liquefied drink food (drinkable preparations) (when making [many] a compounding ratio).

[0020] Chondroitin sulfate delays the glucose absorption in an intestinal tract, and suppresses rapid lifting of the blood sugar level. In order for the blood sugar level (glucose concentration) to rise and to stop this by the glucose absorbed from the intestinal tract, an insulin is secreted from the pancreas, and the cause of obesity is considered to be the result by which a glucose is incorporated by the fat cell and used for composition and storage of a fat. Therefore, when absorption of the glucose in an intestinal tract is overdue, the phenomenon of

the reservoir of the glucose to the fat cell by insulin secretion is dismissed, and acquires the effectiveness of being hard to grow fat as a result also from the same content of a meal.

[0021] After grinding a salmon or the cartilagines nasi of **, degreasing and making it decompose using alkali, as for acquisition of chondroitin sulfate, it is desirable to perform enzyme processing and to carry out a purification extract. After grinding, acquisition processing is performed for making cleaning efficient. although there is not much yield % to raw-material weight as a shark fin, it is alike and advantageous in cost. moreover, there is no inferiority in weight % obtained from a raw material compared with cow bone bone marrow, and crushing processing is also easy and alike at safety or cost, and advantageous.

[0022] It carries out to grinding a salmon or the cartilagines nasi of ** for preventing the degradation breakage on the chondroitin sulfate resulting from generation of heat at the time of crushing, and obtaining much good chondroitin sulfate from the limited raw material under the low temperature service of 30-60 degrees C of minus. Moreover, if it grinds less than [minus 30 degree C], pulverizing will become possible and it will also become easy to arrange grain size.

[0023]

[Embodiment of the Invention] In order to extract chondroitin sulfate from a salmon or the cartilagines nasi of **, the following manufacture step is taken.

[0024] ** Acquire the salmon trout head as industrial waste discharged from the acquisition seafood processing works of a raw material, separate only the cartilagines nasi except for epidermis, a bone, a meat grain, etc., grind the cartilagines nasi under -50-degree C conditions preferably, and obtain the -30 degrees C or less of the main raw materials. It depends for the rotational frequency of a crusher on a raw material configuration or whole weight. Grain size can be made small, so that the temperature at the time of processing is low.

[0025] ** Add enough edible degreasers (for example, acetone) for the powder of the cartilagines nasi in which the cartilage carried out cleaning crushing, and perform suitable time amount, for example, stirring for 5 - 15 minutes. more than the equivalent twice of the cartilagines-nasi powder from which the amount of the acetone used serves as the main raw material -- let 1.5 times to 7 times be a rule of thumb preferably. Also with equivalent weight, cleaning chooses the optimal amount, after calculating cost, since the processing time became long, although it was possible. If the amount of the acetone used is increased, although processing of a cleaning process can be shortened, since cost increases, a 1.5 to 3 times (weight ratio) as many acetone as this is usually used.

[0026] Cleaning processing is performed two or more times preferably. A supernatant is thrown away, a new degreaser is filled up and stirred and it is 1 - 2 times ***** about the same processing. And obtain precipitate eventually and it is made to dry, and when preservation is required, it saves at about low temperature, for example, -30 degrees C.

[0027] ** Melt a cartilagines-nasi powder [finishing / alkali treatment cleaning] to 0.2M sodium hydroxide, warm suitable time amount, and add stirring. 30-40 degrees C of temperature conditions of warming are preferably made into 37 degrees C. It is for raising processing speed and suppressing component change. The processing time is the range for 120 - 180 minutes. Then, an acetic acid neutralizes pH to 7.0.

[0028] ** Add the pronase digestive 0.2 MTris-HCl buffer solution (pH7.8), and add calcium acetate so that it may be set to final concentration 0.02M. A methanol is added for preservation from decay and it warms in a 37-degree C water bath for 24 to 48 hours. In the meantime, it stirs if needed.

[0029] ** Carry out centrifugal separation of the ethanol precipitate digestive juices at low temperature (for example, 3-5 degrees C), and filter a supernatant. Calcium acetate equivalent to 5% is added to filtrate, and an acetic acid adjusts to pH4.5 if needed. Then, the ethanol of the amount of 2 double is added and it is left for 24 to 48 hours.

[0030] ** Carry out centrifugal separation of the desiccation ethanol liquid to washing of precipitate at low temperature (3-5 degrees C), and collect precipitate. Ethanol is added here 80% and it stirs slowly for 5 to 12 hours. Centrifugal separation is carried out again here, and ethanol is added and washed. Ethanol concentration may be reduced rather than the first time. The count of washing is 2 - 3 times. Centrifugal separation recovers precipitate and it dries with means, such as a manometric method.

[0031] ** As purification pretreatment, stir DOWEX 50Wx2 cation exchange resin in 3N HCL for 1 to 2 hours, and stir it in 2N HaOH after rinsing for 1 to 2 hours. This is repeated 2 to 3 times and rinsed. Absorbent cotton is put in the bottom of a suitable column (for example, 2.5x40cm column), and resin is packed so that air may not enter.

[0032] Next, it dissolves in very a small amount of deionized water, and the obtained mucopolysaccharide

(precipitate dry matter) is passed and left in a column (about 30 minutes). In a column, a sink neutralizes the deionized water of about 4 times of the resin volume, and effluent is immediately neutralized by 1N NaOH.

[0033] On the occasion of purification, neutralization liquid will be dialyzed in deionized water for two to three days. Condense this, after filtering using a filter, it is made to dry (for example, freeze drying), and the chondroitin sulfate of a salmon/***** is obtained.

[0034] By the above actuation, it averaged from the cartilagineous tissue of a degreased salmon / **, and about 1 / 4% of the weight of chondroitin sulfate (acid mucopolysaccharide fraction) was obtained. Thus, the obtained chondroitin sulfate is the 1 sulfation GalNAc the 4th place of C as a result of a component analysis. It is the 1 sulfation GalNAc the 6th place of 28.4%C. It is the 1 sulfation GalNAc 52.8%C4 and the 6th place of C. 7.8% unsulfating [GalNAc]. It is 11.0%, and sulfuric-acid radical distribution is structure comparatively more nearly random than the conventional thing, and a larger operation can be expected not only by anti-obesity operation but by bioactive. However, it is important that chondroitin sulfate can be acquired to a large quantity, cheapness, and insurance in this invention.

[0035] The acquisition approach is established from the former — as for Betula-alba sap, the application to cosmetics is already tried. The Betula-alba sap which also obtained this invention with the general acquisition method is used.

[0036] it should point out — recently, in many foreign countries, the technique about Betula-alba sap (the same is said of the sap of Betulaceae Betula) is reported, and although the content of a report is different in each country, a common inclination is seen at least in that a diuretic effect is accepted in Betula-alba sap in our country, South Korea, and China. Even if it is the same tree sap, the environmental difference of vegetation — or although a different report may arise from the bioactive human differences (difference in eating habits etc.) of a place concerned, in the Asia-Pacific coast area, it is supposed that the urination effectiveness based on Betula-alba sap is accepted fundamentally.

[0037] the chondroitin sulfate of the salmon trout origin which can acquire this invention to a large quantity and insurance paying attention to this point — in addition, the thing for which Betula-alba sap acquirable in our country and neighboring countries (the China northeast section and the Russia area of South Korea and the Pacific coast) is blended — especially, it is going to cancel the shape of various kinds of joint pain resulting from obesity. It is thought that obesity prevention and the analgesic action of a joint can be urged to urination acceleration according to the cleaning effect of the blood accompanying blowdown of the impurity in the living body by urination although it is known for many years that it is effective for cold or various kinds of slight diseases.

[0038] The cost of Betula-alba sap can be held down somewhat low. It is because there is little need. Although the realistic problem suited the manufacturing cost of chondroitin sulfate with an anti-obesity operation, by substituting the chondroitin sulfate of a salmon/***** for this, even if it adds Betula-alba sap, about 1/ of former is the cost of 3, and the manufacture of functional food including the both sides of chondroitin sulfate and Betula-alba sap of it was attained. Consequently, it becomes possible for possibility that the functional food which includes the both sides of chondroitin sulfate and Betula-alba sap over a long period of time daily and continuously can be taken in to increase, and not to carry out too much diet limit, to control obesity, and to control diseases, such as gout and rheumatism.

[0039] Betula-alba sap filters and sterilizes the sap punched and obtained (for example, low-temperature heat sterilization), and it is used for it. As for ****, it is desirable not to carry out, but to leave as it is and use sap concentration. It is because it is not desirable that thermal efficiency is bad, and dregs arise and become cloudy etc. if it ****. In addition, sap is not drained even if it carries out secular acquisition. The stable reservation of the sap of a constant rate can be carried out by changing the part punched although the amount of extravasation may become less.

[0040]

[Effect of the Invention] It becomes possible a large quantity, insurance, and to carry out product supply cheaply about the functional food which blended the Betula-alba sap which promotes urination, purifying [as explained above, controlled obesity without carrying out too much diet limit according to an operation of the chondroitin sulfate which according to the functional food concerning this invention delays the glucose absorption in an intestinal tract and suppresses rapid lifting of the blood sugar level, and] blood simultaneously.

[0041]

[Example] The following table 1 is an example of the component of the konnyaku jelly () grape taste. In order to make, raw materials 1-5 are mixed, and it heats and dissolves above 85 degrees C. Subsequently, raw materials

6 and 7 are added and pH adjustment is performed (preferably pH3.8). A raw material 8 is added after deaeration and a cup is filled up with 70 degrees C. This is sterilized 80 degrees C for 30 minutes, and it cools. In addition, as a gelling agent, for example, Sun Calah No.1865B (trademark; solar chemical) is used. It is for giving elasticity to a product. The range of the loadings of chondroitin sulfate is 0.3-1g.

[0042]

[A table 1]

	原 材 料 名	重量(%)
1	ゲル化剤	1.20
2	グラニュー糖	5.00
3	クエン酸三ナトリウム	0.12
4	果糖ブドウ糖液糖	10.00
5	白樺樹液（水溶液）	Up to 100
6	1/6グレープ果汁	6.00
7	50%クエン酸	0.20
8	グレープフレーバー	0.25
9	コンドロイチン硫酸	Max 1 g

[0043] The following table 2 is an example of the component used for the jelly drink of the yogurt flavor of smooth konnyaku mouthfeel. In order to make, raw materials 1-6 are mixed, and at 90 degrees C, it heats for 5 minutes and dissolves. Subsequently, a raw material 7 is added and pH adjustment is performed. At 90 degrees C, hot pack restoration is carried out, it cools, and a product is obtained. In addition, Sun Calah No.2030 are used as a gelling agent. It is because it excels in heat-resistant acid resistance. The range of the loadings of chondroitin sulfate is 0.3-1g.

[0044]

[A table 2]

	原 材 料 名	重量(%)
1	ゲル化剤	0.4
2	グラニュー糖	6.00
3	クエン酸三ナトリウム	0.10
4	乳化油脂	15.00
5	果糖ブドウ糖液糖	6.0
6	白樺樹液（水溶液）	Up to 100
7	クエン酸	pH 3.8
8	香料	0.1
9	コンドロイチン硫酸	Max 1 g

[0045] The following table 3 is an example of the component used for the grapefruit jelly drink of smooth konnyaku mouthfeel. In order to make, raw materials 1-5 are mixed, and at 90 degrees C, it heats for 5 minutes and dissolves. Subsequently, a raw material 6 is added and a raw material 7 performs pH adjustment. A raw material 8 is added, and at 90 degrees C, hot pack restoration is carried out, it cools, and a product is obtained. In addition, Sun Calah No.2030 are used as a gelling agent. It is because it excels in heat-resistant acid resistance. The range of the loadings of chondroitin sulfate is 0.3-1g.

[A table 3]

	原 材 料 名	重量(%)
1	ゲル化剤	0.4
2	グラニュー糖	7.50
3	クエン酸三ナトリウム	0.20
4	還元麦芽糖水あめ	5.00
5	白樺樹液（水溶液）	Up to 100
6	1/6グレープフルーツ果汁	3.0
7	クエン酸	pH 3.8
8	香料	0.1
9	コンドロイチン硫酸	Max 1 g

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TECHNICAL FIELD

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PRIOR ART

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EFFECT OF THE INVENTION

[Effect of the Invention] It becomes possible a large quantity, insurance, and to carry out product supply cheaply about the functional food which blended the Betula-alba sap which promotes urination, purifying [as explained above, controlled obesity without carrying out too much diet limit according to an operation of the chondroitin sulfate which according to the functional food concerning this invention delays the glucose absorption in an intestinal tract and suppresses rapid lifting of the blood sugar level, and] blood simultaneously.

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MEANS

[Means for Solving the Problem] The functional food applied to this invention in order to attain said object contains the chondroitin sulfate of a salmon or the cartilages-nasi origin of **, and the sap of the Betulaceae Betula tree.

[0015] This functional food may be used as the liquefied drink which may consider as the shape of elasticity jelly which uses chondroitin sulfate as a principal component, and uses the sap of the Betulaceae Betula tree as a principal component.

[0016] As for chondroitin sulfate, it is desirable to perform enzyme processing and to carry out a purification extract, after grinding a salmon or the cartilages nasi of **, degreasing and making it decompose using alkali, and it is desirable to perform grinding of a salmon or the cartilages nasi of ** under the low temperature service of 30-60 degrees C of minus.

[Translation done.]

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OPERATION

[Function] The functional food concerning this invention contains the chondroitin sulfate of a salmon or the cartilagine-nasi origin of **, and the sap of the Betulaceae Betula tree. As compared with the chondroitin sulfate of the shark fin origin, the functional component obtained eventually is abbreviation identitas, and let the chondroitin sulfate of a salmon or the cartilagine-nasi origin of ** be a raw material because large quantity acquisition is possible and a price is reduced overwhelmingly. Compared with the chondroitin sulfate of the cow bone bone marrow origin, there is no risk in safety aspects, such as an infectious disease, and, moreover, large quantity acquisition is possible at the same cost.

[0018] On the other hand, the sap of the Betulaceae Betula tree is used for promoting a diuretic effect and attaining clarification of blood in the living body. Moreover, by using the sap (for example, Betula-alba sap) of the Betulaceae Betula tree, the functionality as food taken in daily, such as a psychosedation operation resulting from characteristic aroma, can be raised. Betula-alba sap can come to hand comparatively cheaply from Hokkaido or many north area foreign countries.

[0019] When using chondroitin sulfate as a principal component, it becomes jelly-like food by moisture addition (when making [many] a compounding ratio), and when using the sap of the Betulaceae Betula tree as a principal component, it becomes liquefied drink food (drinkable preparations) (when making [many] a compounding ratio).

[0020] Chondroitin sulfate delays the glucose absorption in an intestinal tract, and suppresses rapid lifting of the blood sugar level. In order for the blood sugar level (glucose concentration) to rise and to stop this by the glucose absorbed from the intestinal tract, an insulin is secreted from the pancreas, and the cause of obesity is considered to be the result by which a glucose is incorporated by the fat cell and used for composition and storage of a fat. Therefore, when absorption of the glucose in an intestinal tract is overdue, the phenomenon of the reservoir of the glucose to the fat cell by insulin secretion is dismissed, and acquires the effectiveness of being hard to grow fat as a result also from the same content of a meal.

[0021] After grinding a salmon or the cartilagine nasi of **, degreasing and making it decompose using alkali, as for acquisition of chondroitin sulfate, it is desirable to perform enzyme processing and to carry out a purification extract. After grinding, acquisition processing is performed for making cleaning efficient. although there is not much yield % to raw-material weight as a shark fin, it is alike and advantageous in cost. moreover, there is no inferiority in weight % obtained from a raw material compared with cow bone bone marrow, and crushing processing is also easy and alike at safety or cost, and advantageous.

[0022] It carries out to grinding a salmon or the cartilagine nasi of ** for preventing the degradation breakage on the chondroitin sulfate resulting from generation of heat at the time of crushing, and obtaining much good chondroitin sulfate from the limited raw material under the low temperature service of 30-60 degrees C of minus. Moreover, if it grinds less than [minus 30 degree C], pulverizing will become possible and it will also become easy to arrange grain size.

[0023]

[Embodiment of the Invention] In order to extract chondroitin sulfate from a salmon or the cartilagine nasi of **, the following manufacture step is taken.

[0024] ** Acquire the salmon trout head as industrial waste discharged from the acquisition seafood processing works of a raw material, separate only the cartilagine nasi except for epidermis, a bone, a meat grain, etc., grind the cartilagine nasi under -50-degree C conditions preferably, and obtain the -30 degrees C or less of the main raw materials. It depends for the rotational frequency of a crusher on a raw material configuration or whole weight. Grain size can be made small, so that the temperature at the time of processing is low.

[0025] ** Add enough edible degreasers (for example, acetone) for the powder of the cartilagine nasi in which

the cartilage carried out cleaning crushing, and perform suitable time amount, for example, stirring for 5 – 15 minutes. more than the equivalent twice of the cartilages—nasi powder from which the amount of the acetone used serves as the main raw material — let 1.5 times to 7 times be a rule of thumb preferably. Also with equivalent weight, cleaning chooses the optimal amount, after calculating cost, since the processing time became long, although it was possible. If the amount of the acetone used is increased, although processing of a cleaning process can be shortened, since cost increases, a 1.5 to 3 times (weight ratio) as many acetone as this is usually used.

[0026] Cleaning processing is performed two or more times preferably. A supernatant is thrown away, a new degreaser is filled up and stirred and it is 1 – 2 times ***** about the same processing. And obtain precipitate eventually and it is made to dry, and when preservation is required, it saves at about low temperature, for example, -30 degrees C.

[0027] ** Melt a cartilages—nasi powder [finishing / alkali treatment cleaning] to 0.2M sodium hydroxide, warm suitable time amount, and add stirring. 30–40 degrees C of temperature conditions of warming are preferably made into 37 degrees C. It is for raising processing speed and suppressing component change. The processing time is the range for 120 – 180 minutes. Then, an acetic acid neutralizes pH to 7.0.

[0028] ** Add the pronase digestive 0.2 MTris-HCl buffer solution (pH7.8), and add calcium acetate so that it may be set to final concentration 0.02M. A methanol is added for preservation from decay and it warms in a 37-degree C water bath for 24 to 48 hours. In the meantime, it stirs if needed.

[0029] ** Carry out centrifugal separation of the ethanol precipitate digestive juices at low temperature (for example, 3–5 degrees C), and filter a supernatant. Calcium acetate equivalent to 5% is added to filtrate, and an acetic acid adjusts to pH4.5 if needed. Then, the ethanol of the amount of 2 double is added and it is left for 24 to 48 hours.

[0030] ** Carry out centrifugal separation of the desiccation ethanol liquid to washing of precipitate at low temperature (3–5 degrees C), and collect precipitate. Ethanol is added here 80% and it stirs slowly for 5 to 12 hours. Centrifugal separation is carried out again here, and ethanol is added and washed. Ethanol concentration may be reduced rather than the first time. The count of washing is 2 – 3 times. Centrifugal separation recovers precipitate and it dries with means, such as a manometric method.

[0031] ** As purification pretreatment, stir DOWEX 50Wx2 cation exchange resin in 3N HCL for 1 to 2 hours, and stir it in 2N HaOH after rinsing for 1 to 2 hours. This is repeated 2 to 3 times and rinsed. Absorbent cotton is put in the bottom of a suitable column (for example, 2.5x40cm column), and resin is packed so that air may not enter.

[0032] Next, it dissolves in very a small amount of deionized water, and the obtained mucopolysaccharide (precipitate dry matter) is passed and left in a column (about 30 minutes). In a column, a sink neutralizes the deionized water of about 4 times of the resin volume, and effluent is immediately neutralized by 1N NaOH.

[0033] On the occasion of purification, neutralization liquid will be dialyzed in deionized water for two to three days. Condense this, after filtering using a filter, it is made to dry (for example, freeze drying), and the chondroitin sulfate of a salmon/***** is obtained.

[0034] By the above actuation, it averaged from the cartilages nasi of a degreased salmon / **, and about 1 / 4% of the weight of chondroitin sulfate (acid mucopolysaccharide fraction) was obtained. Thus, the obtained chondroitin sulfate is the 1 sulfation GalNAc the 4th place of C as a result of a component analysis. It is the 1 sulfation GalNAc the 6th place of 28.4%C. It is the 1 sulfation GalNAc 52.8%C4 and the 6th place of C. 7.8% un-sulfurating [GalNAc]. It is 11.0%, and sulfuric-acid radical distribution is structure comparatively more nearly random than the conventional thing, and a larger operation can be expected not only by anti-obesity operation but by bioactive. However, it is important that chondroitin sulfate can be acquired to a large quantity, cheapness, and insurance in this invention.

[0035] The acquisition approach is established from the former — as for Betula—alba sap, the application to cosmetics is already tried. The Betula—alba sap which also obtained this invention with the general acquisition method is used.

[0036] it should point out — recently, in many foreign countries, the technique about Betula—alba sap (the same is said of the sap of Betulaceae Betula) is reported, and although the content of a report is different in each country, a common inclination is seen at least in that a diuretic effect is accepted in Betula—alba sap in our country, South Korea, and China. Even if it is the same tree sap. the environmental difference of vegetation — or although a different report may arise from the bioactive human differences (difference in eating habits etc.) of a place concerned, in the Asia-Pacific coast area, it is supposed that the urination effectiveness based on

Betula-alba sap is accepted fundamentally.

[0037] the chondroitin sulfate of the salmon trout origin which can acquire this invention to a large quantity and insurance paying attention to this point -- in addition, the thing for which Betula-alba sap acquirable in our country and neighboring countries (the China northeast section and the Russia area of South Korea and the Pacific coast) is blended -- especially, it is going to cancel the shape of various kinds of joint pain resulting from obesity. It is thought that obesity prevention and the analgesic action of a joint can be urged to urination acceleration according to the cleaning effect of the blood accompanying blowdown of the impurity in the living body by urination although it is known for many years that it is effective for cold or various kinds of slight diseases.

[0038] The cost of Betula-alba sap can be held down somewhat low. It is because there is little need. Although the realistic problem suited the manufacturing cost of chondroitin sulfate with an anti-obesity operation, by substituting the chondroitin sulfate of a salmon/***** for this, even if it adds Betula-alba sap, about 1/of former is the cost of 3, and the manufacture of functional food including the both sides of chondroitin sulfate and Betula-alba sap of it was attained. Consequently, it becomes possible for possibility that the functional food which includes the both sides of chondroitin sulfate and Betula-alba sap over a long period of time daily and continuously can be taken in to increase, and not to carry out too much diet limit, to control obesity, and to control diseases, such as gout and rheumatism.

[0039] Betula-alba sap filters and sterilizes the sap punched and obtained (for example, low-temperature heat sterilization), and it is used for it. As for *****, it is desirable not to carry out, but to leave as it is and use sap concentration. It is because it is not desirable that thermal efficiency is bad, and dregs arise and become cloudy etc. if it *****. In addition, sap is not drained even if it carries out secular acquisition. The stable reservation of the sap of a constant rate can be carried out by changing the part punched although the amount of extravasation may become less.

[Translation done.]

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EXAMPLE

[Example] The following table 1 is an example of the component of the konnyaku jelly () grape taste. In order to make, raw materials 1-5 are mixed, and it heats and dissolves above 85 degrees C. Subsequently, raw materials 6 and 7 are added and pH adjustment is performed (preferably pH3.8). A raw material 8 is added after deaeration and a cup is filled up with 70 degrees C. This is sterilized 80 degrees C for 30 minutes, and it cools. In addition, as a gelling agent, for example, Sun Calah No.1865B (trademark; solar chemical) is used. It is for giving elasticity to a product. The range of the loadings of chondroitin sulfate is 0.3-1g.

[0042]

[A table 1]

原 材 料 名		重量(%)
1	ゲル化剤	1.20
2	グラニュー糖	5.00
3	クエン酸三ナトリウム	0.12
4	果糖ブドウ糖液糖	10.00
5	白樺樹液 (水溶液)	Up to 100
6	1/6グレープ果汁	6.00
7	50%クエン酸	0.20
8	グレープフレーバー	0.25
9	コンドロイチン硫酸	Max 1 g

[0043] The following table 2 is an example of the component used for the jelly drink of the yogurt flavor of smooth konnyaku mouthfeel. In order to make, raw materials 1-6 are mixed, and at 90 degrees C, it heats for 5 minutes and dissolves. Subsequently, a raw material 7 is added and pH adjustment is performed. At 90 degrees C, hot pack restoration is carried out, it cools, and a product is obtained. In addition, Sun Calah No.2030 are used as a gelling agent. It is because it excels in heat-resistant acid resistance. The range of the loadings of chondroitin sulfate is 0.3-1g.

[0044]

[A table 2]

	原 材 料 名	重量(%)
1	ゲル化剤	0.4
2	グラニュー糖	6.00
3	クエン酸三ナトリウム	0.10
4	乳化油脂	15.00
5	果糖ブドウ糖液糖	6.0
6	白樺樹液（水溶液）	Up to 100
7	クエン酸	pH 3.8
8	香料	0.1
9	コンドロイチン硫酸	Max 1 g

[0045] The following table 3 is an example of the component used for the grapefruit jelly drink of smooth konnyaku mouthfeel. In order to make, raw materials 1-5 are mixed, and at 90 degrees C, it heats for 5 minutes and dissolves. Subsequently, a raw material 6 is added and a raw material 7 performs pH adjustment. A raw material 8 is added, and at 90 degrees C, hot pack restoration is carried out, it cools, and a product is obtained. In addition, Sun Calah No.2030 are used as a gelling agent. It is because it excels in heat-resistant acid resistance. The range of the loadings of chondroitin sulfate is 0.3-1g.

[A table 3]

	原 材 料 名	重量(%)
1	ゲル化剤	0.4
2	グラニュー糖	7.50
3	クエン酸三ナトリウム	0.20
4	還元麦芽糖水あめ	5.00
5	白樺樹液（水溶液）	Up to 100
6	1/6グレープフルーツ果汁	3.0
7	クエン酸	pH 3.8
8	香料	0.1
9	コンドロイチン硫酸	Max 1 g

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(54) 【発明の名称】 機能性食品

(57) 【要約】

【課題】 過度の食餌制限をすることなく、同時に血液を浄化しつつ利尿を促進する機能性食品を、大量、安全、安価に供給可能とする。

【解決手段】 蛙または鱒の鼻軟骨由来のコンドロイチン硫酸と、カバノキ科カバノキ属樹木の樹液とを含む。コンドロイチン硫酸を主成分とする軟質ゼリー状とする場合があり、カバノキ科カバノキ属樹木の樹液を主成分とする液状飲料とする場合がある。コンドロイチン硫酸は、蛙または鱒の鼻軟骨を粉碎して脱脂しアルカリを用いて分解させた後、酵素処理を施して精製抽出することが望ましく、蛙または鱒の鼻軟骨の粉碎は、マイナス30～60℃の低温条件下で行うことが望ましい。

【特許請求の範囲】

【請求項1】 鮭または鱒の鼻軟骨由来のコンドロイチン硫酸と、カバノキ科カバノキ属樹木の樹液とを含む機能性食品。

【請求項2】 前記機能性食品は、鮭または鱒の鼻軟骨由来のコンドロイチン硫酸を主成分とする軟質ゼリー状とすることを特徴とする請求項1記載の機能性食品。

【請求項3】 前記機能性食品は、カバノキ科カバノキ属樹木の樹液を主成分とする液状飲料とすることを特徴とする請求項1記載の機能性食品。

【請求項4】 前記コンドロイチン硫酸は、鮭または鱒の鼻軟骨を粉砕して脱脂し、アルカリを用いて分解させた後、酵素処理を施して精製抽出することを特徴とする請求項1～請求項3記載の機能性食品。

【請求項5】 前記鮭または鱒の鼻軟骨の粉砕は、マイナス30～60℃の低温条件下で行うことを特徴とする請求項4記載の機能性食品。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明はコンドロイチン硫酸を含む機能性食品に係り、とくに肥満、関節痛、通風を軽減するための機能性食品を大量・安全に製造する技術に関する。

【0002】

【従来の技術】 健康に良好な結果をもたらすいわゆる機能性食品は、日常生活習慣の中で容易に摂取が可能であり、医薬品のように処方限定されないことから、健康に注意を払う者は継続的にある種の成分を食事の一環として摂取する。

【0003】 近時知られるようになった健康食品としては、ビタミン補給のもの、骨を強化するものなどがある。本発明に係る食品は、主として肥満・関節痛・通風を軽減するものである。肥満にしろ関節痛にしろ、その原因は雑多であると考えられ、当該食品を摂取すれば健康上の問題が直ちに解決するわけではない。しかし、肥満、関節痛、痛風などの症状にはある種の共通した傾向ないし相関がみられる。肥満は食べ過ぎが最も基本的な原因である。それ自体としては病気とも呼べないが、肥満に伴う関節痛ないし痛風に到る経緯は、医学上も健康を害している状態といえ、尿酸過多等の食物原因および体内機能の低下が関係するといわれる。

【0004】 この点に関しては、例えば特開平7-255416号公報記載の発明が知られている。これは、フカヒレ等から収得できるコンドロイチン硫酸（ムコ多糖）を主成分として含むもので、コンドロイチン硫酸にセレンウム等の必須微量ミネラルを添加した機能性食品である。この発明においてはコンドロイチン硫酸が古くから老化防止、滋養強壮に効果的であることが指摘されており、セレンウムに関しては体内でのグルタチオンペルオキシターゼの構成成分となり、過酸化脂質に起因す

る連鎖反応的な組織の酸化を防止できるとした上で、老化防止、特に精力減退を防止する上で効果的であるとする。

【0005】 また特開平7-308169号公報記載の発明は、獣骨骨髓から得られるマローエクス、とくにコンドロイチン硫酸に代表されるムコ多糖が多様な成分を生理活性機能を呈することを指摘した上で、これをリウマチ効果に優れた成分であるとする。

【0006】 一方、シラカンバ（ベルコウサカンバ等の他のカバノキ科樹木を含む；以下同じ）に関しては、そのオガクズを培地にしたカバノアタケ菌糸体から有効エキスを抽出することにより薬品または食品に応用する技術が提案されている（特開平10-323168号）。この提案では、カバノアタケの抽出エキスから抗ガン成分を抽出できる旨が指摘されている。

【0007】

【発明が解決しようとする課題】 コンドロイチン硫酸が、リウマチ等、人体の関節部位に作用して良好な結果を得ることは前記特開平7-255416号公報の指摘の通りであり、古くから中国の食医学に関する文献にも記載され周知である。

【0008】 ところで、コンドロイチン硫酸に関する問題は、フカヒレや牛骨骨髓を主原料とするために製造コストが著しく高くなる点にある。古くから知られているコンドロイチン硫酸の取得は、主としてフカヒレ由来（鮫由来）であり、現時点でいえば1kgの販売取引価格は平均15～16万円になる。

【0009】 関節疾患に有効とされるコンドロイチン硫酸の一日の摂取量は、平均1gとされる。従ってフカヒレ由来のコンドロイチン硫酸を使用する場合は、少なくとも原価で150～160円以上のコストを消費者が負担する必要がある。これに他の成分を添加すると製造コストの実費だけでも200円を超え、輸送コストや販売コストを勘案すると一日の最低摂取量を確保するだけで相当額の負担を強いられる。結果として、日常的継続的な摂取は難しい状況にある。

【0010】 牛骨骨髓由来のコンドロイチン硫酸は、骨髓の原価はフカヒレに較べると格段に安い。しかしながら、原材料の重量に比して収量が少なく、また狂牛病のような感染症の虞れがあり、安全性の点で不安が残る。

【0011】 一方、多くの場合、関節疾患は肥満している者に多くみられ、軽度の関節痛からリウマチや痛風という経緯を辿る。これらの因果関係は、肥満に起因する心肺機能の低下ないし血中糖分、尿の酸性度などが指摘される。必要な処置としては、第一に過度の肥満の防止、血中酸度（糖分）の浄化と軽減である。

【0012】 これは最も簡単には食餌制限と利尿の促進によって達成できる。しかし肥満は病害ではないと考えられることから初期段階における食餌制限は難しいし、また利尿促進といっても、単なる水分補給では血液の浄

化や肥満防止はできない。そこで、極端な食餌制限を強制することなく、また利尿作用を高めるために水分とは別に血中の酸や糖を分解して速やかに体外に排出する機能成分の摂取が望まれる。

【0013】本発明の目的は、過度の食餌制限をすることなく、同時に血液を浄化しつつ利尿を促進する機能性食品を、可能な限り大量、安全、安価に製品供給可能とすることにある。

【0014】

【課題を解決するための手段】前記目的を達成するため本発明に係る機能性食品は、鮭または鱈の鼻軟骨由来のコンドロイチン硫酸と、カバノキ科カバノキ属樹木の樹液とを含む。

【0015】この機能性食品はコンドロイチン硫酸を主成分とする軟質ゼリー状とする場合があり、カバノキ科カバノキ属樹木の樹液を主成分とする液状飲料とする場合がある。

【0016】コンドロイチン硫酸は、鮭または鱈の鼻軟骨を粉砕して脱脂しアルカリを用いて分解させた後、酵素処理を施して精製抽出することが望ましく、鮭または鱈の鼻軟骨の粉砕は、マイナス30～60℃の低温条件下で行うことが望ましい。

【0017】

【作用】本発明に係る機能性食品は、鮭または鱈の鼻軟骨由来のコンドロイチン硫酸と、カバノキ科カバノキ属樹木の樹液とを含む。鮭または鱈の鼻軟骨由来のコンドロイチン硫酸を原料とするのは、フカヒレ由来のコンドロイチン硫酸と比較して、最終的に得られる機能成分が略同一であり、大量取得が可能であって価格が圧倒的に低減するからである。また牛骨骨髓由来のコンドロイチン硫酸に比べ、感染症などの安全面での危険がなく、しかも同一コストで大量取得が可能である。

【0018】一方、カバノキ科カバノキ属樹木の樹液を用いるのは、利尿作用を促進し体内血液の浄化を図るためである。またカバノキ科カバノキ属樹木の樹液（例えばシラカバ樹液）を用いることにより、特有の芳香に起因する精神鎮静作用など日常的に摂取する食品としての機能性を高めることが出来る。シラカバ樹液は、北海道や北方圏諸外国から比較的安価に入手できる。

【0019】コンドロイチン硫酸を主成分とする場合（配合比を多くする場合）は、水分添加によりゼリー状食品となり、カバノキ科カバノキ属樹木の樹液を主成分とする場合（配合比を多くする場合）は、液状の飲料食品（ドリンク剤）となる。

【0020】コンドロイチン硫酸は、腸管におけるグルコース吸収を遅らせ血糖値の急激な上昇を抑える。肥満の原因は、腸管から吸収されたグルコースによって血糖値（グルコース濃度）が上昇し、これを抑えるために膵臓からインシュリンが分泌され、グルコースが脂肪細胞に取り込まれて脂肪の合成と貯蔵に利用される結果と考

えられる。従って、腸管におけるグルコースの吸収が遅れた場合はインシュリン分泌による脂肪細胞へのグルコースの貯留という現象は阻却され、同一の食事内容でも結果的に肥満しにくい効果を得る。

【0021】コンドロイチン硫酸の取得は、鮭または鱈の鼻軟骨を粉砕して脱脂し、アルカリを用いて分解させた後、酵素処理を施して精製抽出することが望ましい。粉砕した後に取得処理を行うのは、脱脂を効率的にするためである。原材料重量に対する収量％はフカヒレほどに多くはないが、コスト的には格段に有利である。また牛骨骨髓に較べると、原材料から得られる重量％に遜色なく、破砕処理も容易であって、安全性やコストでは格段に有利である。

【0022】鮭または鱈の鼻軟骨の粉砕を、マイナス30～60℃の低温条件下で行うとするのは、破砕時の発熱に起因するコンドロイチン硫酸の劣化損傷を防止し、限られた原材料からより多くの良質なコンドロイチン硫酸を得るためである。またマイナス30℃以下で粉砕すると、微粉砕が可能となり、粒度を揃えることも容易となる。

【0023】

【発明の実施の形態】鮭または鱈の鼻軟骨からコンドロイチン硫酸を抽出するには、次の製造ステップをとる。

【0024】① 原材料の取得

水産加工工場から排出される産業廃棄物としての鮭鱈頭部を取得し、表皮、硬骨、肉粒などを除き、鼻軟骨のみを分離して-30℃以下、好ましくは-50℃の条件下で鼻軟骨を粉砕し、主原料を得る。破砕機の回転数は原料形状や全体重量に依存する。加工時の温度が低いほど粒度を小さくできる。

【0025】② 軟骨の脱脂

破砕した鼻軟骨の粉粒に十分な可食性の脱脂剤（例えばアセトン）を加え、適当時間、例えば5～15分の攪拌を行う。アセトンの使用量は、主原料となる鼻軟骨粉粒の等量倍以上、好ましくは1.5倍～7倍を目安とする。等量でも脱脂は可能であるが処理時間が長くなるのでコストを計算したうえで最適を選択する。アセトンの使用量を増やせば脱脂工程の処理は短縮できるがコストが高むため、通常は1.5～3倍（重量比）のアセトンを用いる。

【0026】脱脂処理は、好ましくは複数回おこなう。

上澄み液を捨て、新たな脱脂剤を補充して攪拌し、同一処理を1～2回くりかえす。そして最終的に沈殿を得て乾燥させ、保存が必要な場合は低温、例えば-30℃程度で保存する。

【0027】③ アルカリ処理

脱脂済みの鼻軟骨粉粒を0.2M水酸化ナトリウムに溶かし、適当時間の加温を行い、攪拌を加える。加温の温度条件は30～40℃、好ましくは37℃とする。処理速度を高め、成分変化を抑えるためである。処理時間は

120～180分の範囲である。この後、酢酸でpHを7.0に中和する。

【0028】④ プロナーゼ消化

0.2M Tris-HCl緩衝液(pH7.8)を加え、酢酸カルシウムを終濃度0.02Mになるよう加える。防腐のためメタノールを添加し、37℃の湯浴中において24～48時間加温する。この間は、必要に応じて攪拌を行う。

【0029】⑤ エタノール沈殿

消化液を低温(例えば3～5℃)で遠心分離し、上澄みを濾過する。濾過液に5%相当の酢酸カルシウムを加え、必要に応じて酢酸にてpH4.5に調整する。この後、2倍量のエタノールを加えて24～48時間放置する。

【0030】⑥ 沈殿の洗浄と乾燥

エタノール液を低温(3～5℃)で遠心分離し、沈殿を回収する。ここに80%エタノールを加え、5～12時間ゆっくりと攪拌する。ここで再び遠心分離し、エタノールを加えて洗浄する。エタノール濃度は初回よりも低減してよい。洗浄の回数は2～3回である。遠心分離により沈殿を回収し減圧法などの手段で乾燥する。

【0031】⑦ 精製

前処理として、DOWEX 50W×2陽イオン交換樹脂を、3N HCl中で1～2時間攪拌し、水洗後、2N NaOH中で1～2時間攪拌する。これを2～3回繰り返す、水洗する。適当カラム(例えば2.5×40cmカラム)の下に脱脂綿を詰め、空気が入らないよう樹脂を詰める。

【0032】次に、得られたムコ多糖(沈殿乾燥物)を、ごく少量の脱イオン水に溶解しカラムに流して放置する(30分程度)。カラムに樹脂体積の約4倍相当の脱イオン水を流し、流出液をすぐに1N NaOHで中和する。

【0033】精製に際しては、中和液を脱イオン水中で2～3日透析する。これを濃縮し、フィルターを用いて濾過してから乾燥させ(例えば冷凍乾燥)、蛙/鱒由来のコンドロイチン硫酸を得る。

【0034】以上の操作により、脱脂済み蛙/鱒の鼻軟骨から平均して約1/4重量%のコンドロイチン硫酸(酸性ムコ多糖画分)が得られた。このようにして得たコンドロイチン硫酸は、組成分析の結果、

C4位一硫酸化GalNAc	28.4%
C6位一硫酸化GalNAc	52.8%
C4、C6位一硫酸化GalNAc	7.8%
非硫酸化GalNAc	11.0%

であり、硫酸基分布が従来のものよりも比較的ランダムな構造であり、抗肥満作用に限らず生理活性でより広い作用を期待できる。但し、本発明においては大量、安価、安全にコンドロイチン硫酸を収得できることが重要である。

【0035】シラカバ樹液は、すでに化粧品への応用が

試みられるなど、従来からその取得方法は確立されている。本発明も、一般的な取得方式によって得たシラカバ樹液を用いる。

【0036】指摘すべきは、近時、諸外国においてシラカバ樹液(カバノキ科カバノキ属の樹液も同じ)に関する技術が報告されており、報告内容は各国において相違するものの、少なくともわが国、韓国、中国において、シラカバ樹液に利尿作用が認められる点では共通する傾向がみられる。同一の樹木樹液であっても、植生の環境相違によって、或いは当該地の人的な生理活性(食習慣の違いなど)の相違から、異なる報告が生ずる可能性があるが、アジア太平洋沿岸地域では基本的にシラカバ樹液に基づく利尿効果が認められるとされる。

【0037】本発明は、かかる点に着目し、大量かつ安全に取得できる蛙/鱒由来のコンドロイチン硫酸に加えて、わが国および近隣諸国(韓国、太平洋沿岸の中国北東部およびロシア地域)で取得できるシラカバ樹液を配合することにより、特に肥満に起因する各種の関節痛症状を解消しようとするものである。利尿促進は、風邪や各種の軽度の疾患に効果的であることは古くから知られているが、利尿による体内不純物の排出に伴う血液の浄化作用によって、肥満防止および関節の鎮痛作用を促すことが出来ると考えられる。

【0038】シラカバ樹液のコストは、ある程度低く抑えることが出来る。需要が少ないからである。現実的な問題は、抗肥満作用のあるコンドロイチン硫酸の製造コストにあったが、これを蛙/鱒由来のコンドロイチン硫酸に代替することにより、シラカバ樹液を添加しても従来の約1/3のコストで、コンドロイチン硫酸とシラカバ樹液の双方を含む機能性食品の製造が可能となった。この結果、日常的、継続的に長期に渡ってコンドロイチン硫酸およびシラカバ樹液の双方を含む機能性食品を摂取できる可能性が高まり、過度な食餌制限をするまでもなく肥満を抑制し、痛風やリウマチなどの疾患を抑制することが可能となる。

【0039】シラカバ樹液は、穿孔して得た樹液を濾過、殺菌(例えば低温加熱殺菌)して用いる。濾縮はせず、樹液濃度をそのままにして用いることが望ましい。濾縮すると熱効率が悪く、澱が生じて白濁するなど好ましくないからである。尚、経年取得しても樹液は枯渇しない。流出量が減る場合もあるが穿孔する部位を変えることにより一定量の樹液を安定確保できる。

【0040】

【発明の効果】以上説明したように本発明に係る機能性食品によれば、腸管におけるグルコース吸収を遅らせ血糖値の急激な上昇を抑えるコンドロイチン硫酸の作用によって過度な食餌制限をすることなく肥満を抑制し、同時に血液を浄化しつつ利尿を促進するシラカバ樹液を配合した機能性食品を、大量、安全、安価に製品供給することが可能となる。

【0041】

【実施例】下記の表1は、こんにゃくゼリー（）グレープ味の成分の一例である。作るには、原料1～5を混合し85℃以上で加熱し溶解する。次いで原料6、7を添加しpH調整を行う（好ましくはpH3.8）。脱気後、原料8を添加し、70℃でカップに充填する。これを80℃30分殺菌し、冷却する。尚、ゲル化剤としては例えばサンカラNo. 1865B（商標；太陽薬品）を用いる。製品に弾力を与えるためである。コンドロイチン硫酸の配合量は0.3～1gの範囲である。

【0042】

【表1】

原 材 料 名	重量(%)
1 ゲル化剤	1.20
2 グラニュー糖	5.00
3 クエン酸三ナトリウム	0.12
4 果糖ブドウ糖液糖	10.00
5 白樺樹液（水溶液）	Up to 100
6 1/6グレープ果汁	6.00
7 50%クエン酸	0.20
8 グレープフレーバー	0.25
9 コンドロイチン硫酸	Max 1g

【0043】下記の表2は、滑らかなこんにゃく食感のヨーグルト風味のゼリードリンクに用いる成分の一例である。作るには、原料1～6を混合し90℃で5分間加熱し溶解する。次いで原料7を添加しpH調整を行う。90℃にてホットバック充填して冷却して製品を得る。尚、ゲル化剤としては例えばサンカラNo. 2030を用いる。耐熱耐酸性に優れるからである。コンドロイチン硫酸の配合量は0.3～1gの範囲である。

【0044】

【表2】

*

原 材 料 名	重量(%)
1 ゲル化剤	0.4
2 グラニュー糖	6.00
3 クエン酸三ナトリウム	0.10
4 乳化油脂	15.00
5 果糖ブドウ糖液糖	6.0
6 白樺樹液（水溶液）	Up to 100
7 クエン酸	pH 3.8
8 香料	0.1
9 コンドロイチン硫酸	Max 1g

【0045】下記の表3は、滑らかなこんにゃく食感のグレープフルーツゼリードリンクに用いる成分の一例である。作るには、原料1～5を混合し90℃で5分間加熱し溶解する。次いで原料6を添加し、原料7でpH調整を行う。原料8を添加し、90℃にてホットバック充填して冷却し製品を得る。尚、ゲル化剤としては例えばサンカラNo. 2030を用いる。耐熱耐酸性に優れるからである。コンドロイチン硫酸の配合量は0.3～1gの範囲である。

【表3】

原 材 料 名	重量(%)
1 ゲル化剤	0.4
2 グラニュー糖	7.50
3 クエン酸三ナトリウム	0.20
4 還元麦芽糖水あめ	5.00
5 白樺樹液（水溶液）	Up to 100
6 1/6グレープフルーツ果汁	3.0
7 クエン酸	pH 3.8
8 香料	0.1
9 コンドロイチン硫酸	Max 1g

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